

Abstract:

An interactive computer program for seaming a number of single view images (hereinafter referred to as the original single view images) into a panorama. Innovative features make it possible to reduce or eliminate artifacts in the seamed panorama. Several different "windows" can be opened by the user to facilitate the seaming process. Multiple windows can be open at the same time.

One window (referred to as the Panorama Window) can be opened to display the panorama as the seaming operation progresses. Superimposed on the panorama in the Panorama Window are lines which designate the edges of the areas contributed by each original single view image. A user can select an area which is projected from a particular original single view image (referred to as the Selected Image) for further operations. A separate window can be opened to display the Selected Image. Various parameters which affect how the Selected Image is seamed into the panorama can be changed interactively. Among the parameters that can be changes are the position, the orientation, the focal length (i.e. the field of view or magnification of the Selected Image), which image will be on top (i.e. visible) where images overlap, and the opacity curve (i.e. the averaging or feathering over space of opacity) in the area where images overlap. The result of any change is immediately visible in the Panorama Window.

In the Panorama Window, control points are superimposed on the area in the panorama projected from the Selected Image. The user can move the control points, thereby "morphing" or distorting the contribution to the panorama of the Selected Image. The result of how the morphing affects the seaming of the images is immediately viable to the user. The original single view images are not in fact changed. Instead when a user changes a Selected Image, only the transform between the original image and the final panorama is changed.

Each pixel in each of the original single view image is assigned an "alpha" value. The alpha value is a value that is in addition to the conventional red, blue and green values. The alpha value indicates the opacity value of that pixel if the pixel is in an area where two images overlap. An Alpha Window can be opened to show the Selected Image with first and second outlined area. The second outlined area being inside the first outlined area. All

1 pixels inside the second area have an opacity of "1" (that is in an overlap area, they will be
2 visible to the exclusion of pixels in an image that is underneath). All pixels outside the first
3 curve have an opacity of zero (that is in an overlap area, they will not be visible). Between
4 the two areas , opacity changes according to a pre-established curve. A window
5 (hereinafter referred to as an Alpha Window) can be opened which shows the two areas of
6 a Selected Image.

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8 A table is used to store the changes to the transform required in order to arrive at the
9 desired panorama. When a user is satisfied with the appearance of a panorama, both the
10 resulting panorama and the table showing parameters for the transform from the original
11 single view images to the panorama are saved.